

Awareness with Recall in General Anesthesia undergoing Cesarean Section

Gurung T,¹ Shrestha S¹, Basnet U¹, Shrestha AB¹

¹Paropakar Maternity and Women's Hospital, Thapathali, Kathmandu

Received: 2-Jan-2018; Accepted: 15-Jan-2018

Aims: To determine the incidence of awareness with recall in parturient undergoing cesarean section under general anesthesia in Paropakar Maternity and Women's Hospital.

Methods: Retrospective observational cohort study of the patients who underwent cesarean section under general anesthesia from April mid 2014 to April mid 2017 (Baishakh 2071 to Chaitra 2073 BS). Awareness questionnaires filled up through the modified Brice interview.

Results: A total of 162 patients underwent cesarean section under general anesthesia and 138 were included in the study. None of them had awareness and six patients had a dream.

Conclusions: No awareness with recall found and prospective study is required to determine the condition.

Keywords: awareness with recall; cesarean section; dream; general anesthesia

<http://dx.doi.org/10.3126/njog.v13i1.21611>

INTRODUCTION

Awareness is defined as a recall of events occurring during general anesthesia.¹ This term almost universally accepted by both medical and legal circles, and its meaning is well understood. Patients undergoing cesarean section, cardiothoracic surgery or emergency surgery, patients with a difficult airway and those developing intraoperative hypotension are among those considered to have increased chances of awareness and the incidence in this group may be as high as 1–2%.² Additionally, in a survey of 3,000 patients who had general anesthesia for cesarean section, an incidence of about 0.9% for any recall and 7% for dreaming, was reported.³

The most commonly used method of monitoring for awareness is measurement of the patients' end tidal volatile agent concentration.⁴ Assurance of 0.8-1 MAC of exhaled anesthetic agent is likely to assure lack of awareness.

Awareness with recall (AWR) during anesthesia is important because of the long-term complications

that the episode may cause. Post-traumatic stress disorder (PTSD) was found in 14.3%. Characteristic symptoms include anxiety and irritability, insomnia, repetitive nightmares, depression, a preoccupation with death, and a concern with sanity that makes the patients reluctant to discuss their symptoms.⁵ They may fear of doctors, hospital and particularly future operation.

The objective of the study was to evaluate the incidence of awareness with recall in general anesthesia during cesarean section patients through a retrospective cohort analysis, and the clinical description, including the psychological outcome, of the detected cases. Secondary objectives were to evaluate the urgency of cesarean section and the types of awareness.

METHODS

The study design was approved by Paropakar Maternity and Women's Hospital, Institution Review Committee. As this was retrospective observational cohort study, only verbal consent was obtained from patient while interviewing them. All the parturient scheduled for lower segment cesarean section under general anesthesia were enrolled in the study from the period Baisakh 2071 to Chaitra 2073 BS (April 2014-April 2017).

CORRESPONDENCE

Dr. Tara Gurung,
Senior Consultant Anesthesiologist
Paropakar Maternity and Women's Hospital,
Thapathali, Kathmandu
Email: grgtara@hotmail.com;
Mobile No: 9841379504

The demographic data of the parturient such as age, parity and ASA grading and indication for general anesthesia were recorded from hospital record book. All these variables were already incorporated in the hospital record book. Those patient's contact details was taken from the record section.

Assessing the Incidence of Awareness

We assessed the presence of awareness with recall via phone calls. Given the number of patients was interviewed; we chose only one interview time point. Interviewer questionnaires conducted through the modified Brice interview-6 which is defined by the following questions:

- What was the last thing you remember before going to sleep?
- What is the first thing you remember after waking up?
- Do you remember anything between going to sleep and waking up?
- Did you dream during your procedure?
- What was the worst thing about your operation?

After above questions was asked, if the patient had awareness we further classified through Michigan awareness classification.

- Michigan Awareness Classification Instrument
- Class 0: No awareness
- Class 1: isolated auditory perceptions
- Class 2: Tactile perceptions (e.g. surgical manipulation or endotracheal tube)
- Class 3: Pain
- Class 4: Paralysis (e.g. feeling one cannot move, speak or breathe)
- Class 5: Paralysis and pain

An additional designation of "D" for distress was also included for patient reports of fear, anxiety, suffocation, sense of doom, sense of impending death, etc.

Patients who were mechanically ventilated/died in the postoperative period which resulted in a missed interview were excluded in the final analysis.

The choice of anesthetic agents, muscle relaxants, and perioperative analgesia was left to the discretion of the theater anesthesiologist. Being a tertiary care center, all the cases in our institution are managed by anesthesia residents in training supervised by qualified consultant anesthesiologist. All patients

received balanced anesthesia (induction with propofol/sodium thiopentone or ketamine and succinylcholine, maintenance of anesthesia with muscle relaxants and isoflurane (<1 %), opioid after delivery of the baby). Intraoperative monitoring includes continuous electrocardiogram monitoring, pulse oximetry, capnography and noninvasive blood pressure in regular intervals.

Evaluation of awareness was based upon the interview. The primary outcome measure was the incidence of confirmed awareness, which was defined by the patient's recollection of intraoperative events during interview using the structured questionnaire. All patients who were suspected to have awareness as per interview were to be reinterviewed by an independent reviewer to confirm the diagnosis of awareness. Definite awareness was defined as occurring when the patient was certain of having been aware at any time during the operation. Awareness was considered as possible in those cases where the patient thought she had been awake during surgery, but was not completely sure.

All data generated during this study were kept confidential in accordance with institutional policies and that the investigator did not use such data and records for any purpose other than to conducted this study.

Collected data was entered using Microsoft Excel 2010. An awareness endpoint was carried out with the data from patients classified as 'AWR yes' or 'AWR no' as well as 'dreaming yes' or 'dreaming no' in the initial assessment. Results were presented in number (%).

RESULTS

Total delivery in Paropakar Maternity and Women's Hospital during 3 years of periods from 2071 to 2073 BS (April 2014 to April 2017) were 55,642, out of which 41,293 were vaginal delivery and remaining 14,349 were cesarean delivery. Thus the rate of cesarean delivery of was 25.78%. Among total cesarean section in 14,349 cases; only 162 (1.13%) cases had undergone general anesthesia; and 138 of them were included in the final analysis. Twenty four parturient (14.81%) were excluded, three maternal death and 21 parturient could not be reachable.

The demographic data of the parturient were shown in Table 1. One hundred thirteen patients were from age group of 20-35 years which was commonest

reproductive age group. There was 119 ASA I and 19 ASA II parturient. Primigravida were 57 (41.30%), second gravida were 41(30.43%) and multigravidas were 40(28.98%).

Table 1.

Variables	Number (%)
1 Age in years	<20 14 (10.14%)
	20-35 113 (81.88%)
	>35 11 (7.97%)
2 ASA	II 119 (86.23%)
	III 19 (13.76%)
3 Parity	Primi 57 (41.30%)
	Second 41 (29.71%)
	Multi 40 (28.98%)

Table 2.

Indication for General anesthesia for CS	Number
Cord prolapse	40 (28.98%)
Failed SAB or prolong surgery	36(26.08%)
APH	22 (15.94%)
Eclampsia	12 (8.69%)
Hypertensive disorder	9 (6.52%)
Obstructed & 2 nd stage of labor	6 (4.34%)
Anatomy difficulty	5 (3.62%)
Chorioamnionitis	4 (2.89%)
HELLP	4 (2.89%)

The most common indication for general anesthesia was cord prolapse followed by failed spinal or prolongation of surgery. There were 40 (28.98%) cases of cord prolapse and 36(26.08%) cases of failed spinal cases requiring the general anesthesia.

Table 3.

	Total number
Awareness with recall	0
Dream	6 (4.35%)

In the study, none of the parturient has awareness with recall but six parturient (4.35%) had a dreaming as shown in Table 3.

DISCUSSION

Awareness during surgical anesthesia is not a new problem. Incidences were high in the early days. As techniques improved the problem of awareness with recall dwindled into insignificance. The risk of awareness correlates with depth of anesthesia. The patient is paralyzed by a neuromuscular blocking agent, are associated with highest risk of awareness, if the depth of anesthesia was inadequate. Cesarean sections have been defined as a risk factor for the development of awareness under general anesthesia.^{7,8}

In a study conducted by Lyon G et al.³ in 3000 patients who underwent cesarean section under general anesthesia, the frequency rate of remembering anything and the frequency of dreaming were reported to be 0.9 % and 7%, respectively. In this study six (4.35%) patients had dreams; however the relationship between dreams and light anesthesia is not fully established. Bogod DG et al.⁹ found higher incidence of dreaming in the emergency group (28% compared with 7%), stated that may be due to greater degree anxiety.

Awareness in the cesarean section in our population has never been studied; we therefore wanted to detect the incidence of awareness in parturient

The rates of awareness with recall and unpleasant dreams during general anesthesia have been reported in many previous studies. In this study, we have collected total 162 cases in three years period from Baishakh 2071 to Chaitra 2073. Twenty one cases that we couldn't reach through their contact number and three cases of maternal mortality were excluded. However, intraoperative death has not been recorded. In rest of the cases nobody has complained of awareness with recall; although six cases said that they had a dream, which they couldn't remember it. One possible explanation for this difference between our study and the published data could be a variation in anesthetic techniques and because of retrospective study of three years period; while we interviewed some parturient may not recall anything.

Ambulkar RP et al¹⁰ conducted prospective observational study of 934 high risk cancer patients. Those patients were interviewed at three points using the modified Brice interview questionnaire, as we did it our study. They concluded none of their patients reported awareness.

Bergman IJ et al¹ reviewed 8372 incidents reported to the anesthetic incident monitoring study, 81 cases had in which perioperative recall was consistent with awareness; 51 cases of definite awareness and 31 cases with a high probability of awareness. Awareness was mainly due to drug error resulting in inadvertent paralysis of an awake patient and failure of delivery of volatile anesthetics. In developed countries, it also has financial, professional and personal consequences for the anesthesiologist. In a recent closed claims analysis from the USA there were 18 claims for awake paralysis, with a median payment of US \$9500, suggesting that the financial

implications are not trivial.¹¹

Even though central neuraxial blocks are most popular technique for cesarean section; some parturient still undergo the surgery under general anesthesia, because of various reasons like safety of mother (eclampsia, coagulation disorder etc) or safety of baby (cord prolapse, fetal bradycardia etc). In our study cord prolapse is the most common indication for general anesthesia. Besides, hypertensive disorder in 21 cases, almost all the cases had received analgesic dosages of ketamine (20 mg) during induction, which might be the reason patients didn't recall anything. Previous study showed Ketamine more effectively blocked maternal responsiveness to commands and strong stimuli during the first few minutes after anesthetic induction for cesarean section than did thiopental or a combination of thiopental and ketamine, each at a lower dose.¹² Another reason is, in the previous years, we have been using nitrous oxide as analgesia along with other inhalation agent (Isoflurane) during general anesthesia because of institute personal reason we couldn't continue nitrous oxide in our new operation theater. The incidence of awareness appears to vary inversely proportion with the concentration of nitrous oxide. It has been reported to be essentially ablated if a low concentration of a volatile agent is administered with 50% of nitrous oxide in the interval between induction and delivery (e.g. Halothane 0.5%, isoflurane 0.6% etc) and increased concentration of nitrous oxide.¹³ In this study one patient had a failed intubation, in which laryngeal mask airway was inserted. Indication for general anesthesia was for prolongation of surgery.

Assessing depth of anesthesia is challenging as clinical signs are unreliable and not specific. The clinical signs signaling development of awareness are mainly signs due to sympathetic stimulation. Intraoperative hypertension, tachycardia, lacrimation, sweating, coughing and patient movements could

indicate development of awareness. BIS monitoring has been proven to be effective for monitoring depth of anesthesia and scores <60 had been recommended to prevent the occurrence of awareness.¹⁴ However, its availability and cost¹⁵ limit its routine use.

Cesarean section has more chances of awareness, renders patients at risk of inadequate anesthesia because of avoidance of opioids and benzodiazepine until the delivery of baby, as well as rapid induction and maintained with limited volatile agents concentration to decrease the chances of uterine atony, more the concentration of inhalation anesthetic agent, more the chances of uterine relaxation.¹⁴ Another reason to keep light anesthesia, is the important element in resuscitation management due to hemodynamic instability of the patient. However, a noteworthy result was our patients did not remember the period of anesthesia, or their dreams.

Limitation of this study is as this is a retrospective study, some data were missing and there are chances that patient might forget the moment of operation because of an anxiety or long time. Total cases were very low as compared to cesarean section under spinal anesthesia.

CONCLUSIONS

Our investigation showed that none of the cases had the incidence of awareness with recall, however, dreaming were noticed in six patients. Nitrous oxide and ketamine plays vital role in abolishment of awareness with recall.

ACKNOWLEDGEMENTS

We would like to thank our residents from National Academy of Medical Sciences, Kathmandu, and Medical Officers in the Department of Anesthesia Dr. Deepak Maharjan, Dr. Ujjala Maharjan, Dr. Rashu Munankarmi and Dr. Mamta Bhattarai for their support. We would also like to thank our Obstetricians and Anesthesia Assistants of Paropakar Maternity and Women's Hospital for their kind support.

REFERENCES

1. Bergman IJ, Kluger MT, Short TG: Awareness during general anesthesia: a review of 81 cases from the Anesthetic Incident Monitoring Study. *Anaesthesia*.2002; 57:549-56.
2. Errando CL, Sigl JC, Robles M, Calabuig E, Garcia J, Arocas F, et al. Awareness with recall during general anaesthesia: A prospective observational evaluation of 4001 patients. *Br J Anaesth*. 2008;101:178– 85.
3. Lyons G,Macdonald R: Awareness during caesarean section. *Anaesthesia*. 1991;46:62-4.
4. Hardman JG, Aitkenhead AR: Awareness during anaesthesia. *Contin Educ Anaesth Crit Care Pain*.2005; 5:183-6.
5. Ghoneim MM: Awareness during anaesthesia. *Anesthesiology*.2000; 92:597-602.
6. Brice DD, Hetherington RR, Utting JE: A simple study of awareness and dreaming during anaesthesia. *Br J Anaesth*. 1970, 42 (6): 535-42.

7. Sebel PS, Bowdle TA, Ghoneim MM, Ranpil IJ, Podilla RE, Gan TJ, et al. The incidence of awareness during anesthesia: a multicenter United States study. *Anesth Analg* 2004; 99: 833-9.
8. Wang E, Zhi YE, Yundan P, Zangbin S, Changsheng H, Hui L, et al. Incidence and risk factors of intraoperative awareness during general anesthesia. *J Cent South Univ (Med Sci)* 2011;36: 671-5.
9. Bogod DG, Orton JK, Yau HM, Oh TE. Detecting awareness during general anesthetic caesarean section. *Anaesthesia*, 1990; 45:279-84.
10. Ambulkar RP, Agarwal V, Ranganathan P, Divatia JV. Awareness during general anesthesia: An Indian viewpoint. *J Anaesthesiol Clin Pharmacol*. 2016; 32(4): 453-7.
11. Domino KB, Posner KL, Caplan RA, Cheney FW. Awareness during anesthesia: a closed claims analysis. *Anesthesiology* 1999; 90: 1053-61.
12. Schultetus RR, Hill CR, Dharamraj CM, Banner TE, Berman LS. Wakefulness during cesarean section after anesthetic induction with ketamine, thiopental, or ketamine and thiopental combined Anesthesia and Analgesia. 1986;65(7):723-8.
13. Shnider and Levinson's Anesthesia for Obstetrics edited by Samuel C. Hughes, Gershon Levinson, Mark A. Rosen, Sol M. Shnider. 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2002.
14. Robins K, Lyons G. Intraoperative awareness during general anesthesia for cesarean delivery. *Anesth Analg*. 2009;109:886-90.
15. Kotsovolis G, Komninos G. Awareness during anesthesia: How sure can we be that the patient is sleeping indeed? *Hippokratia*. 2009;13:83-9.